Chapter 1: Number Systems

The Interactive Challenge

Live Smart Board Edition. Pick up the pen. No answers provided.

NotebookLM

Concept Bingo

Choose your 16 terms. Cross them out as we play.

Prime	Composite	Coprime	HCF	LCM
Factor Tree	Fundamental Theorem	Contradiction	Irrational	Rational
Euclid	Gauss	Divisor	Remainder	Prime Factorisation
Theorem 1.2	Unique Factorisation	Proof	Coprime Integers	Ascending Order

NotebookLM

The Crossword (Math Vocabulary)

ACROSS

2. gave the first correct proof of the Fundamental Theorem of Arithmetic (5)
5. the logical dead-end reached when an assumption must be false (13)
7. a number with more than two factors, factorisable into primes (9)
8. a number greater than 1 with exactly two factors (5)
9. can be written as p/q for integers p, q with $q \neq 0$ (8)
10. what is left over after division (9)

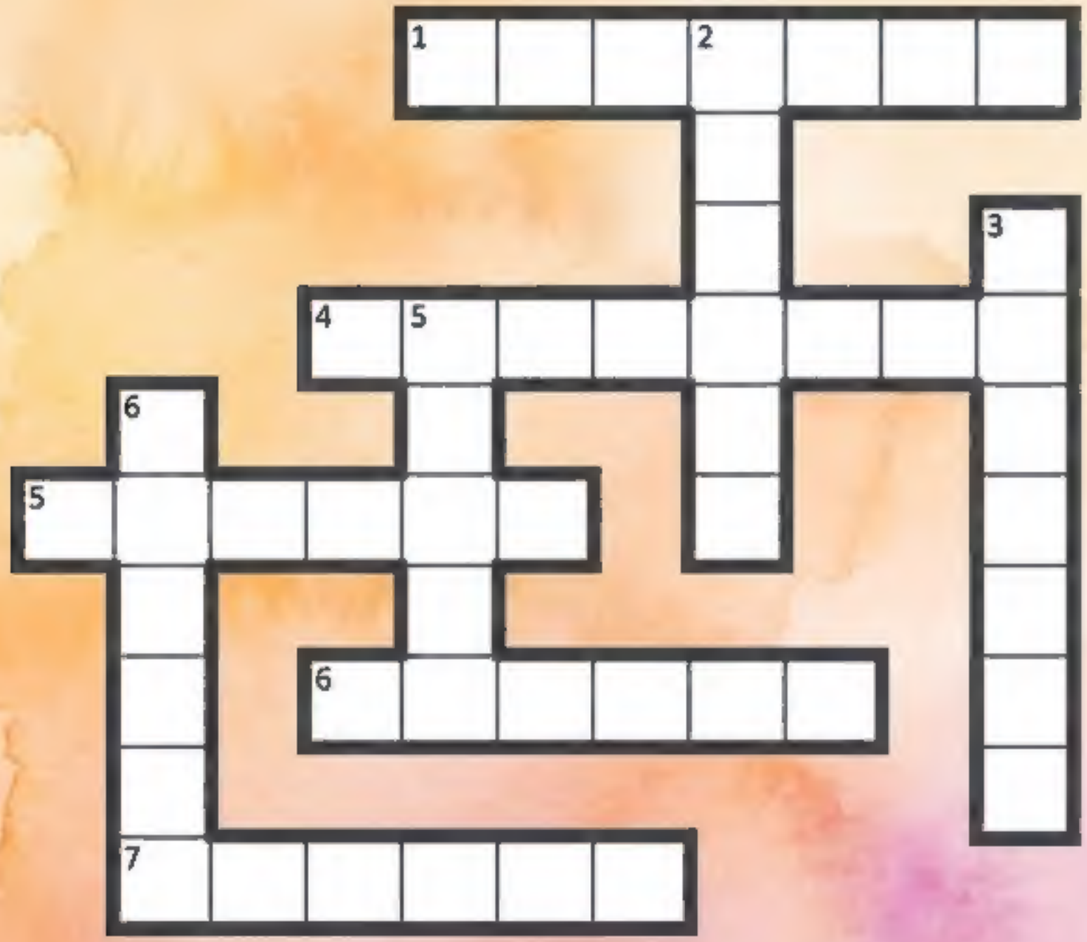
DOWN

1. ancient mathematician behind the division algorithm (6)
3. diagram used to break a number down into its prime factors (10)
4. cannot be written as p/q for integers p, q with $q \neq 0$ (10)
5. two numbers whose only common factor is 1 (7)
6. a mathematical statement proved to be true (7)

NotebookLM

The Crossnumber (Calculations)

Answers are numbers. Wrong maths will not fit.



ACROSS

1. A number to be expressed as a product of prime factors (Ex. 1.1, Q1(iii)) (4 digits)
4. HCF(6, 72, 120) (1 digit)
5. A number to be expressed as a product of prime factors (Ex. 1.1, Q1(ii)) (3 digits)
7. HCF(96, 404) (1 digit)

DOWN

1. LCM(6, 72, 120) (3 digits)
2. HCF(6, 20) (1 digit)
3. A number to be expressed as a product of prime factors (Ex. 1.1, Q1(iv)) (4 digits)
5. A number to be expressed as a product of prime factors (Ex. 1.1, Q1(i)) (3 digits)
6. LCM(6, 20) by the prime factorisation method (2 digits)

Extra Credit Challenges: LCM(96, 404) | HCF(306, 657) | A number to be expressed as a product of prime factors (Ex. 1.1, Q1(v))

NotebookLM

Number Search

Work out the answer, then find it hidden in the grid.

0	3	8	9	2	4	6	5	1	6	2	8	1	9
4	0	8	0	4	1	2	1	6	9	9	3	5	1
8	6	1	9	0	9	9	3	5	7	8	6	5	7
9	7	5	4	3	2	3	6	7	1	9	4	8	7
5	7	4	0	9	1	1	8	9	6	2	5	2	7
6	0	6	1	8	9	5	5	5	6	9	7	9	7
1	3	1	4	7	1	0	4	9	7	4	6	5	0
7	5	2	9	1	7	0	3	4	2	3	6	6	7
1	2	7	6	8	4	2	6	8	4	6	5	6	3
2	1	2	2	3	3	0	7	9	0	2	4	4	0
2	6	8	5	9	9	5	2	8	6	9	0	7	8
6	6	6	6	1	7	6	0	3	1	3	7	2	1
5	9	0	1	0	9	2	8	1	5	9	0	1	3
9	6	2	4	5	9	5	7	1	1	7	7	7	7

☐ 1. LCM(6, 20)

☐ 2. Ex. 1.1 Q1(i) — express as a product of prime factors

☐ 3. Ex. 1.1 Q1(ii) — express as a product of prime factors

☐ 4. One of the two numbers whose HCF is 9

☐ 5. LCM(6, 72, 120)

☐ 6. The other number whose HCF (with 306) is 9

☐ 7. LCM(96, 404)

☐ 8. HCF(306, 657)

NotebookLM

Magic Square

Magic constant: 15.
Fill the empty cells.

8		
3	5	7
		2

NotebookLM

Spot the Mistake

Audit the solutions. Find the planted error.

HCF/LCM of 6 & 20

Step 1. $6 = 2 \times 3$ and $20 = 2^2 \times 5$.

Step 2. HCF is the product of the greatest common power, so HCF $= 2^2 = 4$.

Step 3. LCM is the product of the smallest power of every prime seen, so LCM $= 2 \times 3 \times 5 = 30$.

The first wrong step is Step ___.
It should say:

_____

Identity for Three Numbers

Step 1. $6 = 2 \times 3$, $72 = 2^3 \times 3^2$, $120 = 2^3 \times 3 \times 5$.

Step 2. HCF(6, 72, 120) $= 6$ and LCM(6, 72, 120) $= 360$.

Step 3. Since HCF $\times$ LCM $= a \times b$, it must also equal $6 \times 72 \times 120$ here, so $6 \times 360 = 51840$.

The first wrong step is Step ___.
It should say:

_____

Proving $\sqrt{2}$ is Irrational

Step 1. Assume $\sqrt{2} = a/b$ for coprime integers a, b.

Step 2. Squaring: $a^2 = 2b^2$, so 2 divides a^2, so 2 divides a.

Step 3. Write $a = 2c$. Then $2b^2 = 4c^2$, so $b^2 = 2c^2$ — this confirms b is an integer, no contradiction needed here.

The first wrong step is Step ___.
It should say:

_____

NotebookLM

Quick-Fire Round: Match the HCF

6 and 20	6
96 and 404	2
6, 72 and 120	4
306 and 657	1
12, 15 and 21	3
8, 9 and 25	9

NotebookLM

True or False Sprint

1. Every composite number can be factorised as a product of primes in exactly one way (ignoring order). ☐ TRUE ☐ FALSE

2. 1 is a prime number. ☐ TRUE ☐ FALSE

3. HCF(a, b) × LCM(a, b) = a × b holds for any two positive integers. ☐ True ☐ FALSE

4. HCF(p, q, r) × LCM(p, q, r) = p × q × r for any three positive integers. ☐ True ☐ False

5. 4^n can end in the digit 0 for some natural number n. ☐ True ☐ False

6. If a prime p divides a^2, then p must divide a. ☐ True ☐ False

7. $\sqrt{2}$ can be written as a fraction of two coprime integers. ☐ True ☐ False

8. The sum of a rational number and an irrational number is always irrational. ☐ True ☐ False

9. Every prime number greater than 2 is odd. ☐ True ☐ False

10. The prime factorisation of a number depends on the order you divide in. ☐ True ☐ False

NotebookLM

Two Truths and a Lie

(a) HCF uses the smallest power of each common prime factor.
(b) LCM uses the greatest power of each prime factor present.
(c) $\text{HCF}(a,b) \times \text{LCM}(a,b) = a \times b$ holds for any three positive integers a, b, c.

The lie is _____. Corrected: _____

(a) 4^n never ends in the digit 0.
(b) The only prime factor of 4^n is 2.
(c) 4^n can end in 0 once n is large enough.

The lie is _____. Corrected: _____

(a) $\sqrt{2}$ is irrational.
(b) The proof that $\sqrt{2}$ is irrational assumes $\sqrt{2}$ is rational, then finds a contradiction.
(c) The proof that $\sqrt{2}$ is irrational directly computes its decimal expansion.

The lie is _____. Corrected: _____

NotebookLM

The Escape Challenge

Five gates. Five digits. Unlock the exit code.

GATE 1 — The Factor Gate:
Find HCF(6, 20) using prime factorisation.
Take the answer. [Digit:]

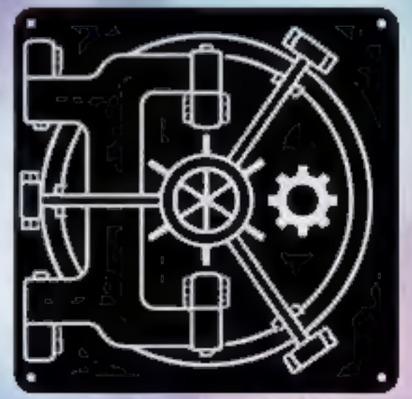
GATE 2 — The LCM Gate:
Find HCF(6, 72, 120) using prime factorisation.
Take the answer. [Digit:]

GATE 3 — The Digit Gate:
HCF(96, 404) = ?
Take the answer. [Digit:]

GATE 4 — The Composite Gate:
How many distinct prime factors does 140 have (2, 5, 7)?
Take that count. [Digit:]

GATE 5 — The Theorem Gate: In Theorem 1.2, if a prime p divides a^2, p divides what power of a? Take the exponent (i.e. 1). [Digit:]

EXIT CODE VAULT



NotebookLM

Chapter 1 Lifeline: Core Formulas

Fundamental Theorem of Arithmetic

Every composite number factorises uniquely.

HCF × LCM Identity

$HCF(a,b) \times LCM(a,b) = a \times b$

Note: Two numbers only!

HCF Rule

Product of smallest common prime powers.

LCM Rule

Product of greatest prime powers present.

Theorem 1.2

If prime p divides a^2, then p divides a.

Proof Skeleton

Assume $p = a/b$, $gcd(a,b)=1$ → leads to contradiction.

Every proof in this chapter comes back to one fact: primes factorise a number in exactly one v

NotebookLM